

Second Five-Year Review Report

for

Mystery Bridge Road at Highway 20

**Natrona County
Casper, Wyoming**

September, 2004

PREPARED BY:

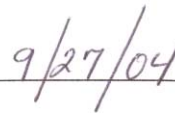
**U.S. Environmental Protection Agency, Region 8
Denver, Colorado**

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Date:



Five-Year Review Report

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List of Acronyms

1,1-DCA	1,1-dichloroethane
1,1-DCE	1,1-dichloroethene
<i>t</i> -1,2-DCE	<i>trans</i> - 1,2 – dichloroethene
1,1,1 TCA	1,1,1-trichloroethane
AOC	Administrative Order on Consent
ARARs	Applicable or Relevant and Appropriate Requirements
BRA	Baseline Risk Assessment
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
DOW/DSI	DOW Chemical Company/Dowell Schlumberger, Inc.
GPM	Gallons per Minute
HQ	Hazard Quotient
IC	Institutional Control
KMI	Kinder Morgan, Inc.
KN	KN Energy
LNAPL	Light Non-Aqueous Phase Liquid
MCL	Maximum Contaminant Levels
NCP	National Contingency Plan
NPL	National Priority List
O&M	Operation and Maintenance
OU1	Operable Unit 1
OU2	Operable Unit 2
PCE	Perchloroethene
PRP	Potentially Responsible Party
RD/RA	Remedial Design/Remedial Action
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SVE	Soil Vapor Extraction
TCE	Trichloroethene
UCL ₉₀	90% Upper Confidence Level
ug/L	Microgram per Liter
USEPA	United States Environmental Protection Agency
VHO	Volatile Halogenated Organics
VOC	Volatile Organic Compounds
WDEQ	Wyoming Department of Environmental Quality

Executive Summary

The U.S. Environmental Protection Agency (EPA) Region 8 conducted a second five-year review of the remedial actions implemented at the Mystery Bridge at U.S. Highway 20 National Priority List Site (the Site) near Casper, Wyoming. The purpose of the five-year review is to determine whether the Site remedy is protective of human health and the environment. The trigger action for this review is the completion of the first five-year review in February 1999. Because hazardous substances, pollutants or contaminants remain at the Site above levels that allow for unrestricted use and unlimited exposure, another five-year review is required by statute.

The Site is divided into two Operable Units. Operable Unit 1 (OU1) includes the ground water contaminant plumes and OU2 includes the sources for ground water contamination. This five-year review evaluates the remedy for OU1. Remediation of ground water contaminant sources is complete. They were conducted as Removal Actions and are not subject to the statutory requirement of five-year reviews.

There are two distinct ground water contaminant plumes at the Site. One plume consists of Light Non-Aqueous Phase Liquid (LNAPL) and dissolved phase petroleum hydrocarbons originating on property owned by Kinder Morgan, Inc. (KMI) where a natural gas processing and compressor station currently operates. The other plume is comprised of dissolve phase chlorinated solvents (primarily perchloroethene) originating on property owned by Dow/Dowell Schlumberger, Inc. (DOW/DSI). This is the location of a former oil field services facility.

The Site remedy included operation of ground water extraction and treatment systems installed on the KMI and DOW/DSI properties. Ground water treatment was by air stripping. Other remedy components included long-term ground water monitoring and institutional controls (ICs) restricting ground water use within the area of contamination. The Record of Decision (ROD) identifies maximum contaminant levels (MCLs) as the action levels for remediation of contaminants of concern. Remedial action objectives (RAOs) included preventing ingestion of contaminated ground water and restoration of the affected aquifer by reducing contaminant concentrations.

Remediation systems operated on the KMI property until August 1996 and the DOW/DSI property until April 2001. Routine ground water monitoring has been conducted at both sites. However, sporadic low-level detections of contaminants above performance standards have precluded compliance with the RAO for aquifer restoration. The ROD recognizes the potential for contaminant concentrations to stabilize at levels above the performance standards. Therefore, there is implied flexibility in evaluating remedy performance relative to numerical standards.

No major concerns were identified during this review. However, the IC restricting ground water use has not been implemented. Implementation of the IC is the responsibility of the Wyoming

Department of Environmental Quality, KMI and DOW/DSI in cooperation with the Wyoming State Engineers Office.

The remedy as designed, constructed, implemented and operated is currently protective of human health and the environment. Contaminated ground water remaining on the KMI and DOW/DSI facilities is not currently used. Ground water contamination in residential areas has remained at or below the MCLs for the last two monitoring events. A public water supply in the residential area minimizes the likelihood of human exposure to Site contaminants.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name: Mystery Bridge Road at Highway 20 Operable Unit 1 Site		
EPA ID: WYD981546005		
Region: 8	State: WY	City/County: Casper/Natrona
SITE STATUS		
NPL status: Final		
Remediation status (choose all that apply): Operating		
Multiple OUs: Yes	Construction completion date: Kinder Morgan - 9/93 DOW/DSI - 11/93	
Has site been put into reuse? Yes - KMI Facility, No - Dow/DSI Facility		
REVIEW STATUS		
Lead agency: EPA		
Author name: Rebecca Thomas		
Author title: Project Manager	Author affiliation: U.S.EPA, Region 8	
Review period: 02/04/99 to 06/04/04		
Date(s) of site inspection: 06/29/04		
Type of review: Statutory		
Review number: 2 (second)		
Triggering action: Previous Five-Year Review Report		
Triggering action date: 2/4/99		
Due date: 2/4/04		

* ["OU" refers to operable unit.]

Five-Year Review Summary Form, cont'd.

Issues:

Item No.	Issues	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
1	Institutional control on ground water use not implemented.	N	Y
2	Sporadic ground water contamination above performance standards.	N	Y
3	Reoccurrence of light non-aqueous phase liquid in multiple monitoring wells during period of low-ground water table.	N	Y

Recommendations and Follow-up Actions:

Item No	Issues	Recommendations and Follow-up Actions	Party Responsible
1	Institutional Control on ground water use not implemented	Implement protocol in use at former Casper Amoco Refinery. Requires providing map to Wyoming State Engineers office illustrating area of concern. State Engineer then solicits technical opinion from Wyoming Department of Environmental Quality (WDEQ) when well permit application is received. State Engineer then implements WDEQ recommendation. EPA notified of WDEQ determination.	WDEQ/PRP
2	Persistent but sporadic ground water contamination above performance standards	Continue monitoring of ground water quality trends.	PRP/EPA
3	Reoccurrence of LNAPL in multiple monitoring wells during period of low ground water table	Continue monitoring of ground water quality trends.	PRP/EPA

Five-Year Review Summary Form, cont'd.

Protectiveness Statement(s):

The remedy as implemented is currently protective of human health and the environment. Contaminated ground water remaining on the KMI and DOW/DSI facilities is not currently used. Ground water contamination in residential areas has remained at or below the action levels for the last two monitoring events. A public water supply in the residential area minimizes the likelihood of human exposure to Site contaminants.

Other Comments:

KMI wishes to abandon portions of a soil vapor extraction system and selected monitoring wells in order to accommodate expansion of the natural gas facility. EPA has approved abandonment of wells and above-ground equipment associated with the air-sparging and soil-vapor extraction systems. KMI expressed a willingness to restore some active remediation of ground water at the property boundary if deemed necessary in the future.

Residual soil contamination remaining in place on the KMI and DOW/DSI Facilities precludes unrestricted land use. Therefore, a deed restriction or other institutional control to limit use in areas with residual contamination is necessary.

The ROD recognized that contaminant levels may cease to decline after reaching concentrations near the remedial goal. Further data evaluation will be conducted to determine if this condition has been reached. If it is determined that this condition exists, consideration will be given to deletion of the Site from the National Priority List.

Five-Year Review Report

I. Introduction

Purpose of the Review

The purpose of five-year reviews is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review reports. In addition, five-year review reports identify issues found during the review, if any, and recommendations to address them.

Authority for Conducting the Five-Year Review

The U.S. Environmental Protection Agency (EPA) is preparing this five-year review pursuant to CERCLA §121 and the National Contingency Plan (NCP). CERCLA §121 states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The EPA interpreted this requirement further in the National Contingency Plan (NCP); 40 CFR §300.430(f)(4)(ii) states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

Who Conducted the Five-Year Review

The EPA Region 8 conducted the five-year review of remedial actions implemented at Mystery Bridge at Highway 20 Operable Unit 1 Site (the Site) near Casper, Wyoming. This review was conducted from June 2004 through September 2004. This report documents the results of the review. HDR Engineering, Inc. (HDR) of Denver, Colorado was retained by EPA Region 8 to provide technical support during preparation of the Five-Year Review Report. HDR was retained under a General Services Administration contract.

Other Review Characteristics

This is the second five-year review for the Site. The triggering action for this review is the date of the previous five-year review in February 1999. Because hazardous substances, pollutants or contaminants remain at the Site above levels that allow for unrestricted use and unlimited exposure, another five-year review is required.

II. Site Chronology

Table 1
Chronology of Site Events

Event	Date
DOW begins operations	1950's
Suspected release of chlorinated solvents at DOW/DSI facility	1950's – 1970's
Purchase of eastern ½ of the current DOW/DSI property	1960's
KN Energy (currently Kinder Morgan, Inc (KMI)) begins operations	1965
10,000-gallon release of absorption oil at KN Energy facility	1965
Resident complaint of poor air and water quality	August 1986
WDEQ begins Site Investigation	Late 1986
Wyoming provides bottled water to affected residents	Late 1986
EPA initiates Expanded Site Investigation	March 1987
KN Energy and DOW/DSI entered into AOCs to perform a remedial investigation and feasibility study (RI/FS)	December 1987
Removal Actions initiated on DOW/DSI property	January 1988
Mystery Bridge Proposed for the NPL	June 1988
Permanent water supply system provided for affected residents	January 1989
Removal Actions initiated at KN Energy property	November 1989
DOW/DSI operations suspended	1990's
Mystery Bridge listed on the NPL	August 1990
RI/FS completed by KN Energy and DOW/DSI	June 1990
USEPA and WDEQ issue Record of Decision	September 1990
Consent Decree between KN Energy and DOW/DSI for remedial design and remedial action (RD/RA) entered by the court	October 1991
DOW/DSI RD complete	February 1993
DOW/DSI begins remedial construction	August 1993

Table 1
Chronology of Site Events

Event	Date
KN Energy remedy constructed under Removal Order formally begins operating under OU1 Record of Decision (ROD)	September 1993
DOW/DSI remedial construction complete/system start-up	November 1993
Light non-aqueous phase liquid (LNAPL) recovery portion of KN Energy remediation system discontinued	1994
All active remediation at KN Energy facility discontinued	August 1996
KN Energy facility placed in post remedial action monitoring	August 1997
KN Energy provides Certification of Completion for Removal Actions under OU2	April 1998
First Statutory Five-Year Review Complete	February 1999
Groundwater pump and treat system at KMI facility (formerly KN Energy) is abandoned	November 2000
DOW/DSI discontinues operation of pump and treat system	April 2001

III. Background

Location and Setting:

The Site is located in Natrona County northeast of Casper, Wyoming. A residential area comprises the majority of the Site. An industrial area where hazardous materials were used lies along the southern and western Site boundary. The Site is bordered to the north by the North Platte River, on the west by the Sinclair/Little America Refining Company (LARCO), and on the south by U.S. Highway 20. Mystery Bridge Road and the Mystery Bridge subdivision extend along the eastern perimeter of the Site (See Site Map-Attachment 1).

The residential area, located on the northern two-thirds of the Site, consists of 125 lots ranging in size from two to five acres. Approximately 100 homes were constructed on these lots at the time the Record of Decision (ROD) was signed. A heavy and light industrial area is located along the southern perimeter of the Site to the south of a Burlington-Northern Railroad right-of-way and north of Highway 20. Heavy industrial activities include natural gas processing by Kinder Morgan, Inc. (KMI - formerly KN Energy) and petroleum refining by LARCO. The DOW/DSI property is the location of an inactive oil field service facility.

Topography in the area varies from flat or gently sloping to slightly rolling. The slope of the land surface is less than 2 percent but ranges between 7 and 25 percent along the banks of the North Platte River. The 100- and 500-year floodplains are within 50- to 100-feet of Elkhorn Creek and the North Platte River. The Site is underlain by an alluvial aquifer which previously served as a water supply to all of the homes in the area. The

uppermost bedrock aquifer, the teapot sandstone formation, provides water to a number of industrial wells in the area.

Site History and Extent of Contamination:

KMI Facility:

The original gas compressor station opened on the present-day KMI property in 1923. KN Energy (and later KMI) has operated a natural gas fractionation, compression, cleaning, odorizing, and transmission plant at the Site since 1965. Operation and maintenance activities are performed on-Site.

Originally constructed as an earthen impoundment, a flare pit was used to collect spent material generated by the facility. Materials that may have been placed in the flare pit include:

- Natural gas condensate
- absorption oil
- emulsions, antifoulants and anticorrosive agents
- liquids accumulated in the flare stack
- potassium hydroxide treated wastes
- lubrication oils and blowdown materials from plant equipment

In October 1984, the western half of the impoundment was backfilled and a new concrete-lined flare pit was constructed on the eastern half. Use of the flare pit was discontinued and the pit was decommissioned in 1987. Waste streams formerly collected in the flare pit were rerouted into above-ground storage tanks for temporary storage or recycling.

A catchment area (a low spot in the ground just west of Elkhorn Creek) collected surface run-off water containing contaminants from the plant area and stream condensate from a dehydration unit. Various activities were undertaken by KN Energy to reroute materials from this area in 1984.

In 1965, an underground pipeline burst during facility start-up and 5,000 to 10,000 gallons of absorption oil were injected under pressure into the ground beneath the process area. Absorption oil is used to remove impurities from natural gas. Other releases occurred between 1965 and 1987 in the form of small leaks and spills near the flare pit and catchment area.

These various sources of petroleum contamination resulted in a plume of light non-aqueous phase liquid (LNAPL) and volatile organic compounds (VOCs) largely restricted to the KMI facility. The LNAPL, identified as weathered lean oil, was first observed in 1989 during the installation of ground water recovery wells. Light non-aqueous phase liquid was not observed in ground water monitoring or recovery wells between 1994 and 2001. Light non-aqueous phase liquid was again observed in as many as six monitoring wells between 2001 and January 2004 at thicknesses of one-foot or less. The occurrence of LNAPL included monitoring wells located just north and east of the KMI facility.

The plume includes non-halogenated VOCs with benzene concentrations occurring as high as 150 ug/L in the mid-1990's and spiking at as high as 470 ug/L in 2000. Subsequent years have seen a decline in benzene concentrations.

The reoccurrence of LNAPL and concurrent spike in benzene concentrations around the year 2000 appears to be associated with historic low water table conditions. It is hypothesized that low water table conditions exposed isolated pockets of LNAPL previously trapped below the water table which then drained to form a layer on the depressed water table.

DOW/DSI Facility:

The DOW/DSI Facility used mobile mounted pumps, tanks and other associated equipment to perform oil and gas production enhancement services for the oil and gas industry. DOW/DSI also performed its own truck repair and stored solvents in drums.

A gravel leach sump for disposal of truck wash water located on the western portion of the property had been in use since shortly after the facility began operations. The wash water is believed to have contained chlorinated solvents. Also located on the western part of the property, a 1,000-gallon oil/water separator tank was used to separate oil film and solids from washed trucks. Separated wash water left the separator and flowed through a vitreous tile drain to the leach sump system.

A toluene storage area was located at the north end of the facility. Contaminants were released from both the wash water disposal system and toluene storage area.

These releases resulted in a ground water plume originating on the DOW/DSI facility containing volatile halogenated organic compounds (VHOs) including 1,1-dichloroethene (1,1- DCE), TCE, *trans*- 1,2 – dichloroethene (*t*-1,2-DCE), tetrachloroethene (PCE), 1,1,1-trichloroethane (1,1,1-TCA) and 1,1-dichloroethane (1,1-DCA). Detection of VHOs extended into the residential area north of the DOW/DSI facility. At the time the ROD was signed, the VHO plume was inferred to have migrated at least 3,500 feet to the north-northeast of the source area on the DOW/DSI property. Volatile halogenated organic compounds were detected at comparable distances from the DOW/DSI facility as recently as April 2004.

Baseline Risk Assessment:

As part of a remedial investigation (RI), EPA prepared a Baseline Risk Assessment (BRA) for the Site in December 1989. The risk characterization assessed carcinogenic risks and the potential for non-cancer health effects of eleven chemicals resulting from direct ingestion of contaminated ground water under residential homes ("current residential scenario"). Risks were also calculated for a hypothetical scenario whereby the KMI and DOW/DSI properties were redeveloped for residential use.

The BRA reported estimated cancer risks of 8E-5 and 5E-5 for the VHO and BTEX plume, respectively, under the current residential scenario. Risks were driven largely by PCE and TCE for the plume associated with the DOW/DSI facility and by benzene for the KMI facility.

For the hypothetical future residential scenario, the BRA reported estimated cancer risks of 3E-4 and 2E-4 for the VHO and BTEX plume, respectively. The potential for non-cancer effects expressed as a Hazard Quotient (HQ) was below 1 and therefore, was below a level of concern.

The BRA concluded that adverse ecological effects due to releases from industrial areas were not expected to be significant.

Although cancer risks under the current residential scenario are below the level typically triggering remedial action of 1E-4, the risk estimates were greater than EPA's point of departure (1E-6) above which cancer risks may be considered unacceptable. In addition, the concentration of several contaminants in ground water exceeded MCLs or proposed MCLs. These included TCE, *t*-1,2 DCE, PCE, and BTEX.

IV. Remedial Actions

The Site is divided into two Operable Units. Operable Unit 1 (OU1) includes the ground water contaminant plumes and OU2 includes the sources for ground water contamination. This five-year review evaluates the remedy for OU1. Remediation of ground water contaminant sources is complete. They were conducted as Removal Actions and are not subject to the statutory requirement of five-year reviews.

KMI Facility:

In 1989, under an OU2 removal order, KN Energy began recovering BTEX from the ground water and soil using ground water pump and treat and soil vapor extraction (SVE) systems. The ground water treatment involved air stripping the contaminants before injecting the treated water. Light non-aqueous phase liquid was noted during construction of the ground water extraction wells. Based on this observation, KN Energy installed LNAPL recovery wells and subsequently recovered 10,800 gallons. Light non-aqueous phase liquid recovery diminished in 1994 when the LNAPL recovery portion of the pump and treat system was shut down. In 1998, KN Energy provided a Certification of Completion for the removal actions under OU2.

The ROD for OU1 specified continued operation of the ground water extraction and treatment system constructed under the removal order. Remediation under OU1 was to continue until MCLs were achieved. Remedial performance standards are discussed further in Section VII of this report.

Requirements for the OU1 remedial design (RD) included ground water monitoring to determine whether additional ground water extraction or monitoring points downgradient

of the facility were needed. The RD determined that contamination above MCLs had not migrated beyond the facility boundary and no system expansion was needed. The major elements of the OU1 remedy include:

- Monitoring ground water.
- Extracting contaminated ground water.
- Air stripping the extracted ground water.
- Injecting the treated ground water.
- IC on ground water use.

Since no expansion to the ground water pump and treat system constructed under the OU2 removal order was needed, no remedial construction was performed under OU1. The remedial action (RA) implemented ground water monitoring and remediation system operation and maintenance (O&M) plans approved during the RD.

The remediation system operated through 1996. After one year of monthly ground water sampling with results below MCLs, the Site was placed in post-RA status in August 1997. This began a two-year period of post-RA quarterly monitoring. EPA approved an October 1997 request by KN Energy to modify the 1993 ground water monitoring plan changing the quarterly sampling events to the months of February, May, August and November. Near the end of the two-year post-RA monitoring period, benzene concentrations were detected above the remedial performance standard of 5 ug/L. As a result of sporadic exceedences of the performance standard, a work plan for additional sampling was prepared by KMI (after purchasing the KN Energy facility) and submitted to EPA in 2000. Information resulting from this additional sampling revealed no new sources of contamination that could account for the exceedences of remedial performance standards.

In October 2000, KMI made a request to EPA to abandon the pump and treat system including ground water extraction wells. The EPA approved the request that same month and abandonment was implemented during November and December 2000.

KMI made a January 2001 written request to modify the ground water monitoring network including discontinuing ground water sampling at two wells and abandonment of 11 additional wells. EPA approved the request in February 2001.

In accordance with post-RA ground water monitoring requirements, RAOs will not be achieved until the 90 percent upper confidence limit of the arithmetic mean (UCL₉₀) for eight consecutive quarters of ground water monitoring data do not exceed the remedial performance goals. This test is performed for each monitoring well included in the post-RA monitoring program. Remedial performance goals are discussed in Section VII.

DOW/DSI Facility:

Removal activities under OU2 were initiated in January 1988 and included the installation of an SVE system and excavation of contaminated soils. The SVE system recovered approximately 6,000 pounds of contaminants in the vicinity of an oil/water separator and waste oil tank. A total of 440 cubic yards of contaminated soil were removed from a chlorinated sump area and disposed off-Site. Post-removal confirmatory soil sampling was conducted in one of the source areas. The results of this sampling indicated that no further removal work was needed.

The ROD for OU1 specified the construction and operation of a ground water extraction and treatment system. Remediation under OU1 was to continue until MCLs were achieved or estimated human health risks declined below a cancer risk range of $1\text{E-}4$ to $1\text{E-}6$. Remedial performance standards are discussed further in Section VII of this report.

Many of the OU1 DOW/DSI selected remedy components are the same as for the KMI facility and include:

- Monitoring ground water
- Extracting contaminated ground water.
- Air stripping the extracted ground water.
- Injecting the treated ground water.
- IC on ground water use.

Unlike the KN Energy facility, the DOW/DSI remedy included natural attenuation of the portion of the ground water contaminant plume extending beyond the northern DOW/DSI property boundary.

Construction of the ground water extraction/treatment system began with the installation of three extraction wells in August 1993. Subsequent construction included the installation of a ground water treatment unit and an infiltration gallery. No additional monitoring wells were installed during initial remedial construction.

Construction was determined to be complete based on a November 1993 site inspection. The remediation system operated continuously between November 1993 and April 2001 when EPA approved DOW/DSI's request to cease active remediation. The request was based on the appearance of a petroleum sheen entering the ground water treatment equipment and measurable LNAPL near the north boundary of the DOW/DSI property. The remediation system was not designed to accommodate LNAPL.

The ground water extraction rate averaged approximately 100 gallon per minute (gpm) between June 1999 and April 2001. During the reporting period the treatment system effluent met the discharge limit of 100 ug/L of tetrahalomethane imposed by WDEQ.

In accordance with post-RA ground water monitoring requirements, RAOs will not be achieved until the UCL₈₅ of the arithmetic mean for eight consecutive quarters of ground water monitoring data do not exceed the remedial performance goals. This test is performed for each monitoring well included in the post RA monitoring program. Remedial performance goals are discussed in Section VII.

Site-Wide Remedial Removal Action

In addition to contaminant recovery measures conducted under removal and remedial actions for OU1 and OU2, EPA extended the Town of Evansville's water supply to serve the residents in the Brookhurst and Mystery Bridge subdivisions. This action minimized the likelihood of ground water use for domestic purposes.

An IC controlling ground water use is a component of the OU1 remedy for both the KMI and DOW/DSI facilities as well as the impacted portion of the residential area. Ground water well installation and use is controlled by the Wyoming State Engineer. The State Engineer regulates only ground water rights (priority of use) and the quantity used.

V. Progress since the Last Review

The first five-year review identified no issues related to remedy protectiveness and recommended no changes in the remedial program. The following Statement of Protectiveness was provided in the first five-year review:

"No recommendations are made other than to continue the ongoing program that was detailed by the ROD."

Since the first five-year review the following major events and progress towards achieving the RAOs occurred:

KMI Facility:

1. No active remediation occurred during the five-year review period. Regular ground water monitoring was conducted through the five-year review period.
2. The concentration of toluene, ethylbenzene and xylenes were reported below remedial performance standards for the last quarter of 2003 and the first quarter of 2004.
3. The concentration of benzene was reported to range between not detected and 29 ug/L during the last quarter of 2003 and the first quarter of 2004. Exceedences of remedial performance standards occurred both on the KMI property and immediately north of the facility boundary.
4. An LNAPL layer appeared in several monitoring wells beginning in February 2001. Measurable LNAPL was last reported in January 2004.

DOW/DSI Facility:

1. Active remediation at the DOW/DSI Site was discontinued in 2001 due to the appearance of LNAPL. Regular ground water monitoring was conducted through the five-year review period.
2. Based on ground water quality monitoring data collected in the first and second quarters of 2004, detected contaminants were limited to PCE and TCE occurring at concentrations below 11 ug/L. Contaminant concentrations in samples collected within the residential areas ranged from not detected to 5.6 ug/l of PCE.

At the time the ROD was signed, the VHO plume was inferred to have migrated at least 3,500 feet to the north-northeast of the source area on the DOW/DSI property. Volatile halogenated organic compounds were detected at comparable distances from the DOW/DSI facility as recently as April 2004.

VI. Five-Year Review Process

Administrative Components:

This is the second five-year review for the Site. The five-year review was led by Rebecca Thomas, EPA Remedial Project Manager for the Site. The following Team Members participated in the review:

- Rebecca Thomas, EPA Remedial Project Manager
- Rob Henneke, Community Involvement Coordinator
- Richard Sisk, EPA Attorney
- Donald Fischer - WDEQ Project Manager

EPA Contractors:

- Kenneth Napp, HDR Engineering, Inc.

This five-year review consisted of the following activities: a review of relevant documents; a meeting with representatives of KMI and DOW/DSI, their contractors and WDEQ; risk assessment review; data review; and a site visit. The schedule for the review extended through September 2004.

Community Involvement:

A notice that the five-year review was in progress was placed in the Casper Star Tribune on July 30, 2004. The notice invited members of the public to submit their questions or comments regarding the review to EPA.

In October 2004, a notice will be placed in a local newspaper announcing that the five-year review has been completed and that copies of the report are available for the public to review at the:

U.S. EPA Region 8 Records Center
999 18th Street (3rd Floor South Tower)
Denver, CO 80202
(303) 312-6473

Wyoming Department of Environmental Quality
122 West 25th St, Herschler Building
Cheyenne, WY 82002
(307) 777-7937

For many years there have been no concerns about the site expressed by residents of the local neighborhoods and communities, or by Casper or Evansville city officials or by Natrona County officials. When monitoring wells are sampled in the residential area, the current residents do not express any concern about the site.

Document Review:

In preparing this Five-Year Review Report, the following documents were reviewed:

- Record of Decision, USEPA, 1990.
- Consent Decree, Civil Action No. 91-CV-1042B, U.S. District Court, District of Wyoming, 1991.
- Preliminary Site Close Out Report, Mystery Bridge Superfund Site, Natrona County, Wyoming, USEPA December 12, 1993.
- Operation and Maintenance Plan for the DOW Chemical/Dowell Schlumberger Remedial Design and Remedial Action at the Bookhurst/Mystery Bridge Site, May 1993.
- First Five-Year Review Report, USEPA, February 1999
- Memorandum from Helen Dawson (USEPA Region 8) to Lisa Loyd (USEPA Region 8) regarding natural attenuation at the KMI facility, January 2000.
- Work Plan for Additional Sampling, KMI Casper Compressor Station, Adrian Brown, August 2000.
- Summary of Recent Activities Related to Free Product Discovery, KMI Casper Compressor Station, letter to Rebecca Thomas, April 30, 2001.

- Memorandum from Walter Weinig of Adrian brown to Rebecca Thomas of USEPA summarizing a June 17, 2002 meeting between KMI and USEPA regarding the occurrence of LNAPL. June 25, 2002.
- January and April 2004 Sampling Progress Reports, KMI Casper Compressor Station.
- February and May 2004, DOW/Dowell Brookhurst/Mystery Bridge Site, Monthly Progress Reports: Consent decree for Remedial Action (OU1), and Administrative Order for Removal Action on Consent (OU2).

Interviews were conducted with the following individuals to provide supplemental technical information:

- Tom Mueller – WWC Engineering (Consultant to DOW/DSI)
- Walter Weinig - Laramide Environmental (Consultant to KMI)
- Sheryl Verplancke - Wyoming State Engineers Office

Data Review:

The remedy includes a ground water monitoring program designed to track ground water levels and quality both on the KMI and DOW/DSI facilities as well as on portions of the Site north of these facilities. In preparing this Five-Year Review Report, data from the following reports were reviewed and evaluated:

- February and May 2004, DOW/Dowell Brookhurst/Mystery Bridge Site, Monthly Progress Reports: Consent decree for Remedial Action (OU1), and Administrative Order for Removal Action on Consent (OU2).
- January and April 2004 Sampling Progress Reports, KMI Casper Compressor Station.
- Summary of Recent Activities Related to Free Product Discovery, KMI Casper Compressor Station, letter to Rebecca Thomas, April 30, 2001.

A summary of these data and their interpretation for demonstrating remedy performance is provided below.

KMI Facility:

The ground water flow direction during early 2004 was slightly north of east and varies seasonally with a stronger northerly component at other times during the five-year review period.

The concentration of benzene was reported to range between not detected and 29 ug/L during the last quarter of 2003 and the first quarter of 2004. Exceedences of remedial performance standards occurred both on the KMI property and immediately north of the facility boundary.

An LNAPL layer appeared in several monitoring wells between February 2001 and January 2004. During this period, LNAPL was observed in as many as six monitoring

wells at thicknesses of one-foot or less. The occurrence of LNAPL included monitoring wells located just north and east of the KMI facility. This was the first observation of LNAPL since product recovery measures were discontinued in 1994.

The reoccurrence of LNAPL and a concurrent spike in benzene concentrations around the year 2000 appears to be associated with historic low water table conditions. It is hypothesized that low water table conditions exposed isolated pockets of LNAPL previously trapped below the water table which then drained to form a layer on the depressed water table.

Remedial action was not conducted on the KMI property during the review period. Therefore, no remediation system performance data were generated.

In accordance with post-RA ground water monitoring requirements, RAOs will not be achieved until the UCL_{90} of eight consecutive quarters of ground water monitoring data do not exceed the numerical performance goals discussed in Section VII. Performance standards have not been met using this assessment method.

DOW/DSI Facility:

Potentiometric surface maps show a ground water flow direction with a strong easterly component on the DOW/DSI property in early 2004. However, ground water flow direction varies seasonally with a stronger northerly component at other times during the five-year review period. The historical and recent occurrence of VHOs in residential areas northeast of the DOW/DSI facility suggests significant variability in the ground water flow direction.

Hydraulic capture analysis was not assessed as ground water extraction ceased in April 2001.

VHO isoconcentration contour maps show an area of contaminated ground water in the center of the DOW/DSI property with a maximum PCE concentration of 11 ug/L. Tetrachloroethene concentrations at the eastern (downgradient) property boundary ranged from 5 to 8.4 ug/L. Tetrachloroethene concentrations in the residential area ranged from not detected to 5.6 ug/l. The maximum PCE concentration in the residential area was measured in a monitoring well over 3,000 feet from the DOW/DSI property boundary. Sporadic PCE concentrations of this magnitude are typical of the past several years.

In accordance with post-RA ground water monitoring requirements, RAOs will not be achieved until the UCL_{85} of eight consecutive quarters of ground water monitoring data do not exceed the numerical performance goals discussed in Section VII. Performance standards have not been met using this assessment method.

Site Inspection:

The Site Inspection was performed on June 29, 2004 by the EPA Remedial Project Manager, Rebecca Thomas; Rob Henneke, Community Involvement Coordinator; Donald Fischer, WDEQ Project Manager, and Kenneth Napp, the HDR Project Manager. Personnel from KMI and DOW/DSI and their consultants conducted a tour of the Site. The purpose of the Site inspection was to observe the current Site condition and ground water monitoring network, and to discuss the results of ground water monitoring.

Remediation systems on both properties were not operating. Portions of the remediation system on the KMI property had been demolished. Site security was adequate at both facilities although Site contaminants pose no recognized threat to trespassers. A tour of the residential areas north of the KMI and DOW/DSI facilities was conducted by Tom Mueller of WWC and involved drive-by observation of monitoring wells. The protective casing and lids for those monitoring wells noted during the tour appeared to be in good condition. Mr. Mueller reported no deficiencies.

VII. Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

The remedy consists of two components:

- Interrupt the exposure pathway through prohibition on the use of ground water.
- Restore ground water through active remediation. Natural attenuation was also a component of the remedy for the downgradient portion of the DOW/DSI VHO plume.

The construction of a permanent water supply for the Site residents in 1989 minimized the likelihood of residential use of contaminated ground water. However, a temporary IC is described in the ROD as deed and ground water use restrictions. This IC has not been implemented and therefore, this portion of remedy is not functioning as intended in the decision documents.

The remedy anticipated several milestones including:

1. No ground water contaminated above MCLs or proposed MCLs will be allowed to enter the subdivision from the KMI property.
2. The ground water restoration time frame for the BTEX plume originating on the KMI property is one year.

3. The ground water restoration time frame for VHO plume originating on the DOW/DSI property is six years.
4. Continuation of the removal action on KMI property that was in progress at the time the ROD was signed.

Each of these milestones is addressed below:

Milestone No. 1 - Ground water samples have regularly been collected from a set of monitoring wells located immediately down-gradient of the KMI property and several hundred feet from the nearest residence. These wells include EPA 9-1, EPA 10-1 and EPA 2-11. Benzene concentrations during the five-year review period have remained below 22 ug/L. Although this concentration exceeds the MCL of 5 ug/L, the location of the residences remain several hundred feet down-gradient from the monitoring locations. This, coupled with the lack of persistent exceedences of MCLs at these monitoring locations suggests that ground water exceeding MCLs has not encroached on the residential areas.

Milestone No. 2 - Active remediation of ground water was conducted at the KMI facility for approximately six years after the ROD was signed (discontinued in August 1996). Despite the extended period of active remediation, benzene concentrations persist at levels exceeding the MCL both on and down-gradient of the KMI facility. However, the ROD recognized that the actual remediation time frame may deviate from the stated expectation of one year. The ROD further recognized that contaminant levels may cease to decline and may remain constant at levels higher than the remediation goal. Although benzene concentrations spiked during the first two years of the five-year review period at levels up to 90 times the MCL, the benzene concentrations appear to have stabilized at much lower levels during the last three years of the review period.

Milestone No. 3 - Active remediation of ground water was conducted at the DOW/DSI facility for approximately eight years (discontinued in April 2001). Tetrachloroethene concentrations persist above MCLs on the DOW facility and at levels as high as the MCL in a portion of the residential area. However, exceedences of MCLs are sporadic and the PCE concentration has remained below 11 ug/L during the five-year review period. As with the KMI facility, the ROD recognized that the actual remediation time frame may deviate from the stated expectation of six years. The ROD further recognized that contaminant levels may cease to decline and may remain constant at levels higher than the remediation goal.

Milestone No. 4 - KN Energy issued a certificate of completion in 1998 for all source mitigation work performed under removal orders. However, some association appears to exist between the occurrence of LNAPL in several monitoring wells in 2001 and the spike in benzene concentrations described under Milestone No. 2, above.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy selection still valid?

The MCLs for the chemicals detected during the five-year review period remain unchanged from those specified in the ROD.

Question C: Has other information come to light that could call into question the protectiveness of the remedy?

There is no other information that calls into question the protectiveness of the remedy.

Technical Assessment Summary

According to the data reviewed and the Site inspection, the remedy is largely operating as intended by the ROD. Sporadic post-remedial low-level detections of contaminants above the performance goals were anticipated by the ROD as is re-evaluation of remedy performance goals.

Protectiveness currently is achieved through interruption of exposure pathways. No use of contaminated ground water occurs on the KMI or DOW/DSI properties where most of the remaining contaminated ground water exists. The continued use of a public water supply in the residential areas minimizes the likelihood of human contact with contaminated ground water. However, an IC prohibiting ground water use required under the ROD has not been implemented. Implementation of this IC will further reduce the likelihood of human contact with contaminated ground water.

VIII. Issues

Based on the information collected during the second five-year review, the following issues were identified:

Table 2
Issues

Item No.	Issues	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
1	Institutional control on ground water use not implemented.	N	Y
2	Sporadic ground water contamination above performance standards.	N	Y
3	Reoccurrence of light non-aqueous phase liquid in multiple monitoring wells during period of low-ground water table.	N	Y

IX. Recommendations and Follow-up Actions

Table 3
Recommendations and Follow-up Actions

Item No	Issues	Recommendations and Follow-up Actions	Party Responsible
1	Institutional Control on ground water use not implemented	Implement protocol in use at former Casper Amoco Refinery. Requires providing map to Wyoming State Engineers office illustrating area of concern. State Engineer then solicits technical opinion from Wyoming Department of Environmental Quality (WDEQ) when well permit application is received. State Engineer then implements WDEQ recommendation. EPA notified of WDEQ determination.	WDEQ/PRP
2	Persistent but sporadic ground water contamination above performance standards	Continue monitoring of ground water quality trends.	PRP/EPA
3	Reoccurrence of LNAPL in multiple monitoring wells during period of low ground water table	Continue monitoring of ground water quality trends.	PRP/EPA

X. Protectiveness Statement(s)

The remedy as implemented is currently protective of human health and the environment. Contaminated ground water remaining on the KMI and DOW/DSI facilities is not currently used. Ground water contamination in residential areas has remained at or below the action levels for the last two monitoring events. A public water supply in the residential area minimizes the likelihood of human exposure to site contaminants. The protectiveness of the remedy will be further enhanced once institutional controls are implemented.

XI. Next Review

The Site requires ongoing five-year reviews in accordance with CERCLA § 121 (c). The next five year review for the Mystery Bridge Site will be performed by August 2009, five years from the date of this review.

ATTACHMENT 1
Site Map



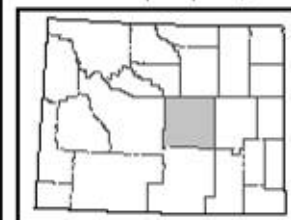
Mystery Bridge Site

Brookhurst, Wyoming

Legend

- Rivers
- Roads
- Railroads
- City Limits
- National Priorities Listing (NPL) Boundary

Location of Mystery Bridge Site



In Natrona County, Wyoming



August 31, 2004

Sources: Base image (DOQQ) downloaded from TerraServer: www.terra-server.com
Photo date: 9/17/1994.

Roads and city boundaries are Census 2000
DOI: Tiger data. Hydrology is USGS H110.

275 0 Feet 825



ATTACHMENT 2
Photographs Documenting Site Conditions

Photo Log

Mystery Bridge NPL Site



KMI Facility - View to Southwest



KMI Facility - View to East



KMI Facility - View to West



KMI Facility - View to North



KMI Facility - View to South



DOW/DOWELL Facility - Groundwater treatment equipment building

Photo Log

Mystery Bridge NPL Site



DOW/DOWELL Facility - Vehicle service building and former infiltration gallery - view to south



DOW/DOWELL Facility - Air stripping tower - view to north



DOW/DOWELL Facility - View to northeast